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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Geory William Smaus

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MEYERTONS, HOOD, KIVLIN, KOWERT & GOETZEL (AMD)

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EXAMINER

JOHNSON, BRIAN P

ART UNIT

PAPER NUMBER

2183

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/700,033	<b>Applicant(s)</b> SMAUS ET AL.	
	<b>Examiner</b> BRIAN P. JOHNSON	<b>Art Unit</b> 2183	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 July 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

Claims 1-23 are pending.

#### ***Papers Filed***

Examiner acknowledges receipt of remarks and amendments filed on 25 July 2008.

#### **Claim Rejections - 35 USC § 112**

Rejection is withdrawn in view of Applicant's amendments.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-5, 8-12, 15 and 19-23 rejected under 35 U.S.C. 103(a) as being unpatentable over Jourdan (U.S. Patent No. 6,848,031) in view of Darcy (U.S. Patent No. 7,325,097).
2. Regarding claims 1, 8, 15, and 23 Jourdan discloses a microprocessor, comprising: a system memory (reference 29), an instruction cache (reference 22); a trace cache (reference 26); and a prefetch unit coupled to the instruction cache and the trace cache;

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Jourdan discloses a first level trace cache that, when a miss occurs, a second level cache is accessed (col 3 line 64 to col 4 line 6) as well as a method of accessing the memory when a cache miss occurs (col 4 lines 3-6).

Jourdan fails to disclose “wherein the prefetch unit is further configured to prefetch a line of instructions into the instruction cache in response to a trace being evicted from the trace cache, wherein the line of instructions is not currently needed for execution, and wherein the line of instructions is prefetched in anticipation of instructions included in the evicted trace being re-executed.”

Darcy discloses a demotion system, allowing a higher level cache to demote a block of instructions to a lower level cache in response to an eviction (col 30 lines 6-25).

Jourdan would have been motivated to utilize this technique in order to prevent an eviction from requiring a slow direct memory access.

It would have been obvious at the time of the invention for one of ordinary skill in the art to take the processing system of Jourdan and allow an eviction to demote a block of instructions as in Darcy. The combination would result in the instruction cache prefetching a line of instructions into the instruction cache (from a demotion) in response to an eviction from the trace cache (the higher level cache). This line of instructions is clearly not currently needed for execution, but prefetched in anticipation of a re-execution of these instructions.

3. Regarding claims 2, 3, 9, 10, 19 and 20, Jourdan/Darcy discloses the processor of claims 1, 8 and 15, wherein the prefetch unit is configured to fetch a line into the

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instruction cache comprising instructions that correspond to operations that precede and follow a branch in the evicted trace (col 2 lines 40-46).

*Since these instructions are located in a block, the remaining instructions inherently correspond to operations that either precede or follow an evicted branch instruction.*

4. Regarding claims 4, 11 and 21, Jourdan/Darcy discloses the microprocessor of claims 1, 8 and 15, wherein the prefetch unit is configured to prefetch a plurality of lines of instructions into the instruction cache in response to the trace being evicted from the trace cache. *This limitation appears to be already included in the independent claims.*

5. Regarding claims 5, 12, and 22, Jourdan/Darcy discloses the microprocessor of claims 4, 11, and 21, wherein the prefetch unit is configured to fetch a number of lines that is proportional to the number of branch operations comprised in the evicted trace (Darcy col 30 lines 6-25). *Indeed, they will be the same number instructions which are clearly proportional.*

6. Claims 6, 13, 16 and 17 rejected under 35 U.S.C. 103(a) as being unpatentable over Jourdan/Darcy in view of prior art.

7. Regarding claims 6 and 13, Jourdan discloses the microprocessor of claims 1 and 8.

Jourdan fails to disclose a cache that checks for duplicate information within the cache to inhibit the storing said duplicate information.

Examiner takes Official Notice that it would have been obvious at the time of the invention for one of ordinary skill in the art to take the invention of Jourdan and utilize a cache system that, when presented with information to store, checks if that information already exists and inhibits duplicate storage. In particular, within the invention of Jourdan, the combination would check when there is an eviction from the trace cache.

Regarding the motivation, Examiner asserts that this technique is extremely common practice within cache systems. Storing the same information within different portions of a cache is a waste of resources that can create a detriment to the processing system with regards to space, cost, power and speed.

8. Regarding claim 16, Jourdan/Darcy discloses the method of claim 15, further comprising checking the instruction cache for lines of instructions comprising the instructions corresponding to the evicted trace (Darcy col 30 lines 6-25 in combination with the Official Notice)

9. Regarding claim 17, Jourdan/Darcy discloses the method of claim 16, further comprising inhibiting the fetching of the line of instructions into the instruction cache if the line of instructions is stored in the instruction cache.

*The functionality of claim 17 follows the combination as described above.*

***Allowable Subject Matter***

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10. Claims 7, 14, and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The limitations of these claims, in combination with the independent claims are not found in any art of record.

### ***Response to Arguments***

11. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Examiner thanks Applicant for noting the typographical error with respect to Peled. This error has been corrected so that Jourdan, the proper and maintained rejection, is made appropriately clear on the record. Indeed, the previous action still appropriately stated that the claims were rendered unpatentable over Jourdan in view of prior art on page 5.

The Official Notice with respect to claims 6 and 13 stands. Appellant has traversed this Official Notice. Examiner asserts that most every cache system follows a general principal: if a cache hit occurs (a case where a duplicate would exist), data is read from the cache and no write is made; if a cache miss occurs (a case where no duplicate would exist) data is written and no read is made from the cache. Consider, for instance, Fujimoto (U.S. Patent No. 6,145,055) col 1 line 30 to 57).

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian P Johnson whose telephone number is (571) 272-2678. The examiner can normally be reached on M-F, 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on (571) 272-4174. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For



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more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Brian Johnson/ Patent Examiner Art Unit 2183

/Eddie P Chan/

Supervisory Patent Examiner, Art Unit 2183